NATIONAL GUIDELINE CLEARINGHOUSE™ (NGC)
GUIDELINE SYNTHESIS

MANAGEMENT AND TREATMENT OF PRESSURE ULCERS

Guidelines

1. American Medical Directors Association (AMDA).
   - Pressure ulcers 1996 (reviewed 2003). Columbia (MD): American Medical Directors Association; 1996. 14 p. [18 references]
   - Pressure ulcer therapy companion 1999 (reviewed 2004). Columbia (MD): American Medical Directors Association; 1999. 31 p. [21 references]
2. Consortium for Spinal Cord Medicine (CSCM) Clinical Practice Guidelines. Pressure ulcer prevention and treatment following spinal cord injury 2000 (reviewed 2005). J Spinal Cord Med 2001 Spring;24(Suppl 1):S40-101. [448 references] PubMed
3. Singapore Ministry of Health (SINGAPORE MOH). Nursing management of pressure ulcers in adults. Singapore: Singapore Ministry of Health; 2001 Dec. 27 p. [20 references]
4. Registered Nurses Association of Ontario (RNAO). Assessment and management of stage I to IV pressure ulcers. Toronto (ON): Registered Nurses Association of Ontario (RNAO); 2002 Aug. 104 p. [70 references]
5. University of Iowa Gerontological Nursing Interventions Research Center (UIGN). Treatment of pressure ulcers. Iowa City (IA): University of Iowa Gerontological Nursing Interventions Research Center, Research Dissemination Core; 2002 Aug. 30 p. [58 references]
6. Wound, Ostomy, and Continence Nurses Society (WOCN). Guideline for prevention and management of pressure ulcers. Glenview (IL): Wound, Ostomy, and Continence Nurses Society (WOCN); 2003. 52 p. (WOCN clinical practice guideline; no. 2). [141 references]

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INTRODUCTION:

A direct comparison of the American Medical Directors Association (AMDA; two guidelines), Consortium for Spinal Cord Medicine (CSCM), Registered Nurses Association of Ontario (RNAO), Singapore Ministry of Health (SINGAPORE MOH), University of Iowa Gerontological Nursing Interventions Research Center (UIGN), and Wound, Ostomy, and Continence Nurses Society (WOCN) recommendations for the treatment of pressure ulcers is provided in the tables below.

The guidelines differ somewhat in scope. In addition to addressing treatment of pressure ulcers, CSCM and WOCN address ulcer prevention, a topic that is beyond the scope of this synthesis. (Note: see the synthesis, Prevention of Pressure Ulcers). While most of the guidelines provide recommendations for the general population of adults at risk for pressure ulcers (including adults in acute and long-term care facilities), the CSCM guideline focuses specifically on persons with spinal cord injury.

Two guidelines included in this synthesis were developed by the American Medical Directors Association (AMDA). The second AMDA document (1999 [reviewed 2004]) is a companion guideline that addresses details of managing and monitoring wounds that were not covered in the earlier AMDA clinical practice guideline (1996). Several guidelines (AMDA 1996 [reviewed 2003], AMDA 1999 [reviewed 2004], CSCM, RNAO, SINGAPORE MOH, and WOCN) reviewed the recommendations of the 1994 Agency for Health Care Policy and Research (AHCPR) guideline, "Treatment of Pressure Ulcers". (NGC note: because of its 1994 publication date, the AHCPR guideline does not meet criteria for inclusion in the NGC).

Table 1 compares the scope of each of the guidelines. Table 2 compares recommendations for the assessment/diagnosis and treatment of pressure ulcers, including care plans; wound care; management of infection, tissue load, pain, and nutrition; adjunctive therapy; surgical intervention; and reassessment and ongoing care. Table 3 compares the potential benefits and harms associated with the implementation of each guideline.

The level of evidence supporting the major recommendations is also identified, with the definitions of the rating schemes used by CSCM, SINGAPORE MOH, RNAO, UIGN, and WOCN included in Table 4. References supporting selected recommendations of the SINGAPORE MOH and UIGN guidelines are also provided in this table.

Following the content comparison tables, the areas of agreement and differences among the guidelines are identified.

Abbreviations:

- AHCPR, Agency for Health Care Policy and Research (now the Agency for Healthcare Research and Quality, AHRQ)
- AMDA, American Medical Directors Association
- CSCM, Consortium for Spinal Cord Medicine
- NGC, National Guideline Clearinghouse
- RNAO, Registered Nurses Association of Ontario
- SINGAPORE MOH, SINGAPORE Ministry of Health
- UIGN, University of Iowa Gerontological Nursing Interventions Research Center
- WOCN, Wound, Ostomy, and Continence Nurses Society

TABLE 1: COMPARISON OF SCOPE AND CONTENT	
Objective And Scope	
AMDA (1996 reviewed 2003)	• To improve the quality of care delivered to patients in long-term care facilities • To give health care practitioners and other members of the interdisciplinary team a basic process to effectively assess and manage patients with pressure ulcers, and to try to maximize function and quality of life and minimize risks, complications, functional decline, hospitalization, and death
AMDA (1999 reviewed 2004)	• To address additional details of managing and monitoring pressure ulcers that were not covered in the original 1996 American Medical Directors Association (AMDA) clinical practice guideline
CSCM (2000 reviewed 2005)	• To provide guidance and assistance in the decisions required to restore health, independence, control, and self-esteem to people with spinal cord injury • To provide a conceptual framework within which to develop effective strategies for preventing and treating pressure ulcers
SINGAPORE MOH (2001)	• To enhance appropriateness, effectiveness, and efficiency of care of adults with pressure ulcers • To reduce unacceptable variation in clinical practice
RNAO (2002)	• To present nursing best practice guidelines on the assessment and management of stage I to IV pressure ulcers

UIGN (2002)	• To treat pressure ulcers among elderly patients • To enhance the healing of pressure ulcers
WOCN (2003)	• To present an evidence-based guideline for pressure ulcer prevention and management • To improve cost-effective patient outcomes as well as increase wound research in the areas where there are gaps between research and practice
Target Population	
AMDA (1996 reviewed 2003)	• United States • Elderly individuals and/or residents of long-term care facilities
AMDA (1999 reviewed 2004)	• United States • Elderly individuals and/or residents of long-term care facilities
CSCM (2000 reviewed 2005)	• United States • Adolescents and adults with spinal cord injury (SCI)
SINGAPORE MOH (2001)	• SINGAPORE • Adults with pressure ulcers
RNAO (2002)	• Canada • Patients from all areas of clinical practice with or at risk for developing pressure ulcers
UIGN (2002)	• United States • Adult patients who have been identified with pressure ulcers or who are "at risk" for pressure ulcers
WOCN (2003)	• United States • Patients with or at risk for developing pressure ulcers
Intended Users	

AMDA (1996 reviewed 2003)	Advanced Practice Nurses Allied Health Personnel Nurses Pharmacists Physicians Social Workers
AMDA (1999 reviewed 2004)	Advanced Practice Nurses Allied Health Personnel Nurses Pharmacists Physicians Social Workers
CSCM (2000 reviewed 2005)	Advanced Practice Nurses Allied Health Personnel Health Plans Hospitals Managed Care Organizations Nurses Occupational Therapists Patients Physicians Psychologists/Non-physician Behavioral Health Clinicians Social Workers
SINGAPORE MOH (2001)	Advanced Practice Nurses Nurses
RNAO (2002)	Advanced Practice Nurses Nurses
UIGN (2002)	Advanced Practice Nurses Dietitians Health Care Providers Hospitals Nurses Physical Therapists Physician Assistants Physicians
WOCN (2003)	Advanced Practice Nurses Allied Health Personnel Health Care Providers Nurses Physical Therapists Physician Assistants Physicians

Interventions And Practices Considered	
AMDA (1996 reviewed 2003)	Assessment/Diagnosis 1. History and physical examination 2. Risk factor identification using Braden Scale 3. Pressure ulcer assessment and documentation 4. Psychosocial assessment 5. Nutritional assessment Treatment 1. Care plan 2. Wound cleansing, debridement and dressing 3. Management of infection (tissue culture, infection control measures, topical antibiotics, systemic antibiotics) 4. Tissue load management, including positioning and use of pressure-reducing devices 5. Pain management 6. Nutritional assessment and intervention 7. Consultation with surgical specialist and transfer for surgical management 8. Adjuvant therapy (electrotherapy) 9. Monitoring of healing pressure ulcers 10. Management of comorbid conditions
AMDA (1999 reviewed 2004)	Assessment/Diagnosis 1. History and physical examination 2. Pressure ulcer assessment and documentation 3. Assessment of other factors (nutritional status, comorbidities, pain, psychosocial issues) Treatment 1. Care plan 2. Wound cleansing, debridement, and dressing 3. Management of infection (tissue culture, radiograph, infection control measures, oral or intramuscular antibiotics) 4. Tissue load management, including positioning and use of pressure-reducing devices 5. Pain management 6. Nutritional assessment and intervention 7. Surgical intervention 8. Adjuvant therapy (electrical stimulation, regenerative growth factors) 9. Monitoring of healing pressure ulcers and management of complications

CSCM (2000 reviewed 2005)	Assessment/Diagnosis 1. History and physical exam 2. Assessment of other factors (psychological health, availability of care assistance, etc.) 3. Pressure ulcer assessment and documentation Treatment 1. Care plan 2. Wound cleansing, debridement, and dressing 3. Management of infection (culture, biopsy, antibiotics) 4. Tissue load management, including positioning, posture evaluation, and use of pressure-reducing devices 5. Nutritional assessment and intervention 6. Referral for surgical intervention, including preoperative and postoperative care and identification of complications of surgery 7. Adjuvant therapy (electrical stimulation) Note: ultraviolet radiation, low-energy laser radiation, normothermia, ultrasound, subatmospheric pressure therapy, hyperbaric oxygen, topical agents, cytokine growth factors, and nonantibiotic systemic drugs were reviewed but not recommended. 8. Referral for psychosocial interventions 9. Monitoring of healing pressure ulcers 10. Management of complications of pressure ulcers
SINGAPORE MOH (2001)	Assessment/Diagnosis 1. Pressure ulcer assessment and documentation 2. Nutritional assessment 3. Psychosocial assessment 4. Pain assessment Treatment 1. Care plan 2. Wound cleansing, debridement and dressing 3. Pain management 4. Nutritional assessment and intervention 5. Monitoring of healing pressure ulcers
RNAO (2002)	Assessment/Diagnosis

	1. History and physical exam 2. Psychosocial assessment 3. Pressure ulcer assessment and documentation 4. Vascular assessment 5. Nutrition assessment 6. Pain assessment 7. Assessment of risk for developing additional ulcers Treatment 1. Care plan 2. Wound cleansing, debridement, and dressing 3. Management of infection (culture, infection precautions, topical antibiotics, systemic antibiotics) 4. Tissue load management, including positioning and use of pressure-reducing devices 5. Pain management 6. Nutritional assessment and intervention 7. Surgical intervention, if applicable 8. Adjuvant therapy (electrical stimulation, vacuum-assisted closure and normothermic therapies, therapeutic ultrasound, ultraviolet light, pulsed electromagnetic fields, growth factors and skin equivalents) 9. Monitoring of healing pressure ulcers 10. Discharge/transfer arrangements
UIGN (2002)	Assessment/Diagnosis 1. Pressure ulcer assessment, including photos to document and monitor progress Treatment 1. Care plan 2. Wound cleansing, debridement, and dressing 3. Management of infection (culture, topical antibiotics) 4. Tissue load management 5. Nutritional assessment and intervention 6. Adjuvant therapy (hyperbaric oxygenation, negative pressure wound therapy, and electrical stimulation) 7. Monitoring of healing pressure ulcers
WOCN (2003)	Assessment/Diagnosis 1. Risk assessment 2. Pressure ulcer assessment 3. Assessment for potential complications

	4. Assessment of factors that impede healing Treatment 1. Care plan 2. Wound cleansing, debridement, and dressing 3. Management of infection (culture, topical antibiotics, systemic antibiotics) 4. Tissue load management, including positioning and use of pressure-reducing devices 5. Pain management 6. Nutritional assessment and intervention 7. Referral for surgical intervention (direct closure, skin grafts, flaps) 8. Adjuvant therapy (growth factors, electrical stimulation, noncontact normothermic radiant heat, vacuum-assisted wound closure) Note: ultrasound, electromagnetic therapy, and hyperbaric oxygen therapy were discussed but not recommended. 9. Monitoring of healing pressure ulcers NGC Note: Portions of this guideline address prevention of pressure ulcers, a topic addressed in a separate synthesis (see NGC synthesis Prevention of Pressure Ulcers).

TABLE 2: COMPARISON OF RECOMMENDATIONS FOR MANAGEMENT OF PRESSURE ULCERS	
Assessment	
AMDA (1996 reviewed 2003)	Recognition • Document in the medical record any patient history of pressure ulcers. • All skin surfaces should be exposed for a thorough examination on admission. Skin inspection also should be done as a component of routine care (for example, both at bath time and upon readmission to the facility). • Direct caregivers should be thoroughly educated and encouraged to detect signs of breakdown, especially in the early stages. • Document any signs and symptoms of pressure ulcers, the suspected cause(s), and intervention strategies implemented in the medical record. • Staff should be alerted to differentiate between pressure ulcers and vascular ulcers of the lower extremities, as the

latter have different etiologies, treatment strategies, and prognoses.

- The Braden Scale, a screening and risk assessment tool for pressure ulcers, should be completed on admission and quarterly for patients at high risk or following a significant temporary or permanent change in condition. (See Table 1 in original guideline document for major risk factors for developing pressure ulcers).
- If no risk factors are found, continue periodic monitoring for development of risk factors.
- If the patient has risk factors, develop intervention strategies, as appropriate, to correct or manage the conditions.
- Risk factors, interventions, or the reasons not to intervene should be documented in the medical record.
- Consider whether the patient has any comorbid conditions which may contribute to the risk, affect functional independence, or alter the healing process. These conditions should be treated as appropriate. (See Table 2 in original guideline document for comorbid conditions that may affect healing).

Diagnosis

- Decide if a work-up is appropriate. A work-up may not be indicated if the patient has a terminal or end-stage condition, if the work-up would not change the management course, or if the patient would refuse treatment. Always weigh the effects of the work-up on the patient. If the burden of the work-up is greater than the benefit of the treatment, then the work-up may not be indicated. The reasons for not doing a work-up should be documented in the medical record.
- Perform a comprehensive history and physical examination, because a pressure ulcer should be assessed in the context of the patient's physical and psychosocial health. Identify co-morbid conditions that may affect healing, and establish a medical care plan consistent with the medical prognosis and the patient's goals. Depression should be considered and treated; also weigh the impact of the pressure ulcers on the patient's social and occupational status. The current nutritional and hydration status also should be assessed.
- A physical examination should include the staging of the ulcer(s). (See Table 3 in original guideline document for pressure ulcer classifications).
- The initial medical record documentation for each wound should include the location, size, depth, color of the wound and surrounding tissues, and description of any drainage. Also check for:
    - Peripheral pulses when lower extremity ulcers are present
    - Signs and symptoms of altered hydration and

	nutrition • Signs of incontinence • Mobility • Presence of contractures • Ability to sense and react to pain and discomfort • In most cases, weekly reassessment and documentation of the wound characteristics is recommended. • The medical workup should include an assessment of dietary and fluid intake. Ensure that the prescribed diet is consistent with the patient's requirements based on his or her clinical status, preferences, and activity level. Remove unnecessary dietary restrictions and assess food consistencies in relation to the patient's ability to chew and swallow. Assess physical barriers (such as dysphagia, hemiparesis/plegia, bradykinesia, tremor, incoordination of fine and gross motor tasks) that may prolong the feeding time. • Depending on the stage and extent of the ulcer and other comorbid conditions, the team may consider obtaining the help of consultants (see Table 4 in original guideline document for consultants to help manage patients with pressure ulcers).
AMDA (1999 reviewed 2004)	Recognition Assess the patient and the wound and document findings. • Appropriately skilled individuals from various disciplines (nurses, nursing assistants, wound care specialists, physical and occupational therapists, physicians, dietitians, consultant pharmacists, etc.) must make and record these observations. • Assessments also should include a review of factors and organ systems that may be affecting the onset or healing of a pressure ulcer, including the patient's general condition, hydration and nutrition status, status of active illnesses (comorbidities), presence and characteristics of any pain, and psychosocial issues. • A physician or a mid-level practitioner such as a nurse practitioner (NP) or physician assistant (PA) should evaluate a complicated, extensive, or non-healing wound in a timely fashion. • The physician should assess an existing pressure ulcer during each routine visit. Assessment Define and interpret the factors that will impact treatment and wound healing.

	• Physical Factors
	  • The treating health care practitioner and nursing staff should identify and document these factors at the start of treatment. Relevant physical factors include those causing or contributing to the wound's development and those that may impact the wound's healing and the development of related complications.
	• Functional Factors
	  • The presence of impaired mobility, self-care deficit, continence problems, activity intolerance, and impaired ability to eat all may influence the onset, extent, duration, and healing of a pressure ulcer.
	• Psychosocial Factors
	  • The patient's ability and willingness to adhere to the treatment program will influence pressure ulcer management.
	• Documentation of these physical conditions and functional and psychosocial factors should be included in initial and follow-up assessments and monitoring activities.

CSCM (2000 reviewed 2005)	<u>Assessment Following Onset of a Pressure Ulcer</u> Assessment of the Individual With a Pressure Ulcer Perform an initial comprehensive assessment of the individual with a pressure ulcer, to include: • Complete history • Physical examination and laboratory tests • Psychological health, behavior, cognitive status, and social and financial resources • Availability and utilization of personal care assistance • Positioning, posture, and related equipment (Scientific evidence: I, II, III, V; Grade of recommendation: A, B, C; Strength of panel opinion: Strong) Assessment of the Pressure Ulcer Describe in detail an existing pressure ulcer. Include the following parameters: • Anatomical location and general appearance • Size (length width, depth, and wound area) • Stage • Exudate/odor • Necrosis • Undermining • Sinus tracts

	• Infection • Healing (granulation and epithelialization) • Wound margins/surrounding tissue (Scientific evidence: I, II, V; Grade of recommendation: A, B, C; Strength of panel opinion: Strong)
SINGAPORE MOH (2001)	Assessment Initial Assessment The initial assessment of a pressure ulcer should include its location, size, stage, condition, odour, amount and type of exudate. The presence, location and extent of sinus tracts, pain and signs of infection, condition of surrounding skin, general condition and diagnosis of patient should also be assessed and documented. (D / 4; Bergstrom et al., 1994; Joanna Briggs Institute for Evidence Based Nursing and Midwifery [JBI], 1997) Wound Size The initial and subsequent outlines of the wound should be traced and dated on a clean transparent plastic material. (D / 4; Bergstrom et al., 1994) Wound Depth / Length of Sinus Tract The depth of the pressure ulcer and the length of sinus tract should be estimated by placing a sterile applicator/catheter to the deepest point. (D / 4; Lagemo et al., 1998) Staging of Pressure Ulcer Staging of pressure ulcers using National Pressure Ulcers Advisory Panel four-level staging system should only be performed during the initial assessment. (D / 3; Bergstrom et al., 1994; Xakellis and Frantz, 1997) Re-assessment A pressure ulcer should be re-assessed at least once a week or when the condition of the patient or wound deteriorates. (D / 4; Bergstrom et al, 1994; JBI, 1997) Nutrition Nutritional Assessment Healthcare providers should do baseline and ongoing assessment

	of nutritional status, appropriate interventions, and evaluation of the effectiveness of medical nutritional therapy. (D / 4; Bergstrom et al., 1994) Psychosocial Assessment Initial Psychosocial Assessment The nurse should perform a psychosocial assessment, including mental status, social support, medications, values and lifestyle and stressors. (D / 4; Bergstrom et al., 1994) Re-assessment Periodic psychosocial re-assessment should be included when the wound management is reviewed. (D / 4; Bergstrom et al., 1994)
RNAO (2002)	History and Physical Examination Conduct a history and focused physical assessment. (Strength of Evidence = C) Psychosocial Assessment Conduct a psychosocial assessment to determine the client's ability and motivation to comprehend and adhere to the treatment program. (Strength of Evidence = C) Assess quality of life (Strength of Evidence = C) Pressure Ulcer Assessment To plan treatment and evaluate its effects, assess the pressure ulcer(s) initially for: • Stage/Depth • Location • Size (mm, cm) • Odour • Sinus tracts/Undermining/Tunneling • Exudate • Appearance of the wound bed • Condition of the surrounding skin (periwound) and wound

edges

(Strength of Evidence = C)

Reassess ulcers at least weekly to determine the adequacy of the treatment plan.

(Strength of Evidence = C)

Vascular assessment (e.g., Ankle/Brachial Pressure Index, Toe Pressure) is recommended for ulcers in lower extremities to rule out vascular compromise.

(Strength of Evidence = C)

Nutrition Assessment and Management

Ensure adequate dietary intake to prevent malnutrition or replace existing deficiencies to the extent that this is compatible with the individual's wishes.

(Strength of Evidence = B)

Prevent clinical nutrient deficiencies by ensuring that the patient is provided with optimal nutritional care through one or more of the following:

(Strength of Evidence = C)

- Consultation with a registered dietitian for assessment
- Consultation with a speech language pathologist for swallowing assessment
- A varied, balanced diet to meet clinical needs for healing and co-existing diseases e.g., renal failure and diabetes
- Nutritional supplements if needed
- Multivitamin and mineral preparations
- Enteral tube feeding
- Parenteral nutrition

(Strength of Evidence = B)

- Ongoing monitoring of nutritional intake, laboratory data, and anthropometric data

Pain

Assess all patients for pain related to the pressure ulcer or its treatment.

	(Strength of Evidence = C) Assess location, frequency, and intensity of pain to determine the presence of underlying disease, the exposure of nerve endings, efficacy of local wound care and psychological need. (Strength of Evidence = B)

UIGN (2002)	Description of Intervention
	
	• Assessment of pressure ulcers should focus upon the following factors:
	  • Location and stage of ulcer (Stage 1 to 4)
	  • Size of ulcers (i.e., length, width and depth)
	  • Presence of tracts or undermining
	  • Ulcer bed appearance
	  • Granulation tissue
	  • Yellow slough
	  • Eschar
	  • Drainage
	  • Presence of rolled wound edges
	  • Odor
	  • Peri-wound skin condition
	• Color photos taken on initial assessment and reevaluation are very helpful in monitoring changes in the wound tissue. However, care must be taken to ensure that the photo accurately depicts the appearance of the wound.
	• Reassess pressure ulcers weekly. If the condition of the patient or the wound deteriorates, reevaluate as soon as noted. Refer to Appendix B in the original guideline document for a Pressure Ulcers Assessment Guide to track the healing progress of the ulcer.

WOCN (2003)	Assessment
	
	• Perform risk assessment on entry to a healthcare setting and repeat on a regularly scheduled basis or when there is a significant change in the individual's condition. Level of evidence = C.
	  • Acute care: Perform initial assessment at admission and reassess at least every 48 hours or whenever the patient's condition changes or deteriorates.
	  • Long-term care: Perform initial assessment at admission. Reassess weekly for the first 4 weeks, then quarterly after that, and whenever the resident's condition changes or deteriorates.
	  • Home-health care: Perform initial assessment at admission and reassess every visit.
	• Identify high-risk settings and groups to target prevention

	efforts to minimize risk. Level of evidence = C. • Inspect skin and bony prominences at least daily. Any skin changes should be documented including a description of the skin changes as well as any action taken. Level of evidence = C. • Assess for cognition, sensation, immobility, friction, shear, and incontinence. Level of evidence = C. • Perform nutritional assessment on entry into a new healthcare setting and whenever there is a change in the individual's condition that may increase the risk of malnutrition. Level of evidence = C. • Assess laboratory parameters to determine nutritional status, which may include albumin or pre-albumin, transferring, and total lymphocyte count. Level of evidence = C. • Assess nutrition to measure effectiveness of nutritional interventions. Level of evidence = C. • Assess for history of prior ulcer and presence of current ulcer, previous treatments, or surgical interventions that increase risk for additional pressure ulcers. Level of evidence = C. • Assess and monitor pressure ulcer(s) at each dressing change, and reassess and measure at least weekly, including location, tissue type, size, tunneling, exudates, presence/absence of infection, wound edges, stage, periwound skin, pain, and adherence to prevention and treatment. Level of evidence = C. • Assess for factors that impede healing status, such as comorbid conditions or medications. Level of evidence = C. • Partial thickness ulcers (stage II) should show evidence of healing within 1 to 2 weeks. Reduction in wound size following 2 weeks of therapy for Stage III and IV pressure ulcers has also been found to predict healing. If the condition of the patients or the wound deteriorates, reevaluate the treatment plan as soon as evidence of deterioration is noted. Level of evidence = B. • Assess for potential complications such as fistula, abscess, osteomyelitis, bacteremia, cellulites, and cancer. Level of evidence = C.
TREATMENT	
Care Plans	
AMDA (1996 reviewed 2003)	Treatment • Treatment interventions for pressure ulcer management should begin with a plan of care, including a prevention and wound treatment plan, based on the Braden Scale and the interdisciplinary admission assessments.

	• Ask about any advance directives with possible implications for treatment, and consider whether the expectations of the patient and surrogate decision makers are compatible with the prognosis established by the physician and other health care professionals. • Review/revise the care plan within fourteen (14) days of admission after reassessment by the interdisciplinary team and follow-up discussions with the patient and family or surrogate, when appropriate. • Reconsider goals following significant and permanent change in the patient's condition as defined in the 1987 Omnibus Budget Reconciliation Act (OBRA '87) Interpretive Guidelines. • Treatment consists of preventive measures, bed and chair therapeutic positioning and tissue load management, debridement of necrotic tissue, wound cleansing, management of infection, topical dressings, infection control, management of comorbid conditions, and education and rehabilitation of the patient/caregiver.

AMDA (1999 reviewed 2004)	Assessments (Problem Identification)
	
	Define the prognosis and identify realistic goals.
	
	• Before selecting treatments, identify the likelihood of wound healing and the benefits of pursuing a specific treatment plan. Table 2 in the original guideline document offers a framework for defining the goals of care for a patient with a wound.
	• Document the particular factors that may affect healing.
	• Ethical issues. Review any advance directives or other care instructions that limit the scope, intensity, duration, and selection of various wound-related or adjunctive treatments.
	
	Identify priorities in managing the wound and the patient.
	
	• Systemic factors
	  • The scope of a treatment plan and the urgency with which it is implemented will depend on conclusions about the patient's condition, the prognosis, and the reversibility of the wounds.
	  • Use a standardized pain assessment tool that is not specific to wound care to assess and monitor pain (for example, the 1999 AMDA guideline on chronic pain management).
	• Wound-related factors
	  • Significant amounts of necrotic tissue, the presence of soft tissue infection, or a malodorous wound may indicate a need for prompt surgical intervention.
	  • It is important to describe any bacterial presence accurately, as a basis for proper management.

	• Environmental factors • Identify environmental factors such as excess pressure and shear, and problematic care processes such as incorrect techniques for turning and positioning. Interpret the implications of the findings for treatment selection. • Establish a realistic, unified care plan • The attending physician should lead the effort to interpret or verify the information, define the problems, identify the priorities, and select the appropriate approaches. The nursing staff, with the participation and support of the physician and practitioners and caregivers of other disciplines, should coordinate the care delivery. Treatment • The overall goals of treatment are to promote wound healing, to prevent complications or deterioration of an existing wound, to prevent additional skin breakdown, and to minimize the harmful effects of the wound on the patient's overall condition. Provide general support for the patient. • Identify a management strategy for general problems such as altered level of consciousness, fever, and malaise. Wherever possible, treat specific medical conditions such as diarrhea or heart failure that may be causing or contributing to wound development or impeding wound healing.
CSCM (2000 reviewed 2005)	A comprehensive treatment plan includes assessment of risk, health status of the individual, and status of the pressure ulcer. The elements of a treatment plan include cleansing, debridement, dressings, surgery, nutrition and management of tissue loads. These elements represent standard treatment procedures as reflected in current literature and practice. However, new research and innovative approaches are being developed in the areas of adaptive therapies.
SINGAPORE MOH (2001)	Patients and their families are important team players in the effective management of pressure ulcer treatment. The clinician should: • Develop an effective plan of care that is consistent with the patient's goals.

	The recommended treatment programme should focus on: • Assessment of the patient and the pressure ulcer(s) • Managing tissue loads • Ulcer care • Managing bacterial colonization and infection • Operative repair of the pressure ulcer(s) • Education and quality improvement
RNAO (2002)	Psychosocial Assessment The goal of a psychosocial assessment is to collect the information necessary to develop a plan of care with the client that is consistent with individual and family preferences, goals and resources (personal, financial etc.). The treatment plan should include interventions to address identified psychosocial needs and goals. Follow-up should be planned in cooperation with the individual and caregiver, in consultation with appropriate interdisciplinary team members. Education Recommendations Involved the patient and caregiver, when possible, in pressure ulcer treatment and prevention strategies and options. Include information on pain, discomfort, possible outcomes, and duration of treatment, if known. Other areas of education may include patient information regarding appropriate support surfaces, as well as roles of various health professionals. Collaborate with patient, family and caregivers to design and implement a plan for pressure ulcer prevention and treatment. (Strength of Evidence = C)

UIGN (2002)	Description of Intervention
	
	• Treatment of pressure ulcers should center on the following intervention activities:
	  • Management of tissue loads (i.e., pressure, friction, and shearing)
	  • Nutritional assessment and support
	  • Ulcer care
	  • Management of bacterial colonization and infection

WOCN (2003)	• Implement appropriate strategies/plans to:
	  a. Attain/maintain intact skin.
	  b. Prevent complications.
	  c. Promptly identify or manage complications.

	d. Involve patient and caregiver in self-management • Implement cost-effective strategies/plans that prevent and treat pressure ulcers
Wound Care	

AMDA (1996 reviewed 2003)	General treatments: Each facility should develop its own specific protocols based on the following general treatment guidelines:
	
	• Intact skin:
	  • In a Stage 1 pressure ulcer, the area involved should be protected from further injury from pressure or shearing forces, but requires no specific dressing. Frequent monitoring is indicated since Stage 1 pressure ulcers may be the heralding sign of a more extensive wound.
	• Clean wound base:
	  • In a Stage 2 pressure ulcer, or healing Stage 3 or 4 wound, the ulcer base is covered with granulation tissue with an epithelial edge extending from the margins. Use a dressing that will keep the ulcer bed continuously moist, while keeping the surrounding intact skin dry. The choice of dressing is determined by clinical judgment, since studies of different types of moist dressings have shown no difference in pressure ulcer healing outcomes. Wound dead space should be filled with loosely packed dressing material that will absorb excess exudate and can maintain a moist environment.
	• Eschar or wound base with adherent necrotic tissue:
	  • Additional treatments are indicated in a wound covered with an eschar, or with surface necrosis of subcutaneous tissue, but without undermining of adjacent tissue. Eschar and surface necrosis should be debrided to allow granulation tissue to grow (with the exception of heel ulcers with dry eschar if they do not have edema, erythema, fluctuance, or drainage). Appropriate measures include sharp surgical debridement, enzymatic agents to hasten the degradation of the necrotic debris, autolysis, or mechanical removal through the use of wet-to-dry dressings, water jets, or whirlpool. If purulence, periulcer inflammation, or foul odor persists for more that two to four weeks, more frequent cleansing or more aggressive debridement may be indicated. Topical antiseptics should not be used.
	• Wounds with extensive subcutaneous tissue damage:
	  • Stage 4, and some Stage 3, pressure ulcers are characterized by full thickness skin loss with

	extensive tissue necrosis, undermining and sinus tracts. Treatment requires extensive surgical debridement, when appropriate, for the patient's condition and care plan. All devitalized tissue should be removed, and it is recommended that undermined areas be explored and unroofed. Clean, dry dressings are recommended for 8 to 24 hours after sharp debridement to help control bleeding, then moist dressings should be reinstituted.
AMDA (1999 reviewed 2004)	Treatment Cleanse and remove dead tissue from the wound • Cleanse wounds that have debris and dead tissue using normal saline solution (NSS), initially and at the beginning of each dressing change. • Make sure that the saline supply is used and discarded according to facility policy to prevent bacterial proliferation after opening. • If the wound is malodorous or has excessive debris, then increase the frequency of cleansing or consider a more aggressive (surgical or sharp) form of debridement. However, it is important not to confuse the odor of accumulated debris on the dressing with the odor of a soft tissue infection. • Wound irrigation—using syringe irrigation or other irrigating devices—should follow proper techniques (see AHCPR Pressure Ulcer Clinical Practice Guideline). Use any such approach cautiously, as excessive pressures may damage tissue. • Whirlpool treatment may facilitate simultaneous cleansing and debridement of larger or multiple wounds, but this should be discontinued when the wound is clean or when the amount of necrotic tissue can be handled adequately by other topical means. • Antiseptic solution (e.g., povidone iodine, acetic acid, Dakins Solution) use should be discouraged, because it may retard wound healing and lead to increased resistance to subsequent antibiotic treatments. <u>Debridement</u> • Remove damaged tissue by one of several available means, each of which has various advantages and drawbacks (see Table 4 in the original guideline document). • Choose a debridement method based on wound size, amount of slough and exudate, the presence and severity of pain associated with the wound or with various forms of debridement, the feasibility of obtaining support for sharp or

	surgical debridement, and the risks or possible problems of transporting the individual for sharp debridement outside of the facility. • In the case of an active, advancing local infection such as cellulitis in a patient who has dead tissue remaining in the wound, a qualified practitioner should perform sharp debridement. • Generally, it is inadvisable to debride heel ulcers with an eschar (either mechanically or chemically) unless the ulcer is associated with signs of infection such as edema, erythema, fluctuance, or drainage. Cover and protect the wound and surrounding skin • The goals of dressing a wound are to keep the ulcer bed moist and the surrounding skin dry and to protect the wound from contamination. • Choose dressings based on wound characteristics including location near contamination sources, presence and amount of exudate, wound depth, and the condition of the surrounding skin. • Use cover dressings that provide sufficient protection against contamination. • Address bowel and bladder incontinence where it may contaminate a wound. • Protect overly dry intact skin with simple moisturizing products. Use moisturizers sparingly so the skin does not remain damp for extended periods.
CSCM (2000 reviewed 2005)	Cleansing Cleanse pressure ulcers at each dressing change. • Use minimum mechanical force when cleaning with gauze, cloth, or sponge. • Use enough irrigation pressure to enhance cleansing without causing trauma to the wound. • Use normal saline or wound cleansers. • Avoid antiseptic agents. • Consider hydrotherapy for ulcers containing large amounts of exudate and necrotic tissue. (Scientific evidence: I, III, V; Grade of recommendation: A, C; Strength of panel opinion: Strong) Debridement Debride devitalized tissue from pressure ulcers using a method appropriate to the ulcer's status and the individual's condition

	and goals. • Debride areas in which there is eschar and devitalized tissue (Scientific evidence: V; Grade of recommendation: C; Strength of panel opinion: Strong) Refer to Table 7 in the original guideline document for a comparison of debridement methods. Dressings Use dressings that will keep the ulcer bed continuously moist and the surrounding intact skin dry. • Use a dressing that controls exudate, but does not desiccate the ulcer bed or macerate surrounding tissue. • Loosely fill pressure ulcer cavities with dressing material to avoid dead space; avoid overpacking the ulcer • Monitor the placement of all dressings, especially those in anatomical areas in which they are difficult to keep intact • Perform dressing changes on a specific schedule based on assessment of the individual, the ulcer, and the condition of the dressing. Consult the dressing manufacturer's package insert for general information and about the frequency of dressing changes. (Scientific evidence: I, II; Grade of recommendation: A, B; Strength of panel opinion: Strong) Refer to Table 8 in the original guideline document for a comparison of major dressing categories.
SINGAPORE MOH (2001)	Wound Cleansing Cleansing Medium The wound should be cleansed with solutions that are non-toxic to granulating tissue, e.g., normal saline. (D / 4; Bergstrom et al., 1994; JBI, 1997) Mechanical Cleansing Appropriate mechanical pressure/force should be used to remove non-viable tissue, excess exudate, and metabolic wastes, without causing trauma to the wound bed. (D / 4; Bergstrom et al., 1994; JBI, 1997)

	Debridement Choice of Debridement Method Necrotic tissues should be debrided. The choice of debridement method should be based on the patient's condition, treatment goal, and type and amount of necrotic tissue in the wound. (D / 4; Bergstrom et al., 1994; JBI, 1997; Bradley et al., 1999) Sharp Debridement Sharp debridement is the preferred choice when debridement is urgently indicated, e.g. advancing cellulitis or sepsis. Sharp debridement is not recommended for patients with low platelet counts or taking anti-coagulant medication or when there is a lack of clinical expertise to perform the debridement. (D / 4; Bergstrom et al., 1994; JBI, 1997) Autolytic Debridement Autolytic debridement techniques should be used when there is no urgent clinical need for drainage or removal of devitalised tissue. It is contraindicated in infected ulcers. (D / 4; Bergstrom et al., 1994) Dressing Moist Wound Healing The dressing should keep the ulcer bed moist and the surrounding tissue (periulcer) skin dry. (D / 3; Bergstrom et al., 1994; Thomas et al., 1998) Choice of Dressings The choice of wound dressings should depend on the treatment goal and the size, shape, depth, location and condition of the wound. (D / 4; Bergstrom et al., 1994) Granulating Wound Granulating wounds should be dressed with hydrocolloid or other non-adherent dressing. (D / 4; Bergstrom et al., 1994) Exudative Wound Exudative wounds should be dressed with highly absorbent material e.g., alginate, foam/hydrofibre or hydropolymer. (D / 3;

	Bergstrom et al., 1994; Hess, 2000) Eschar Wounds with eschar should be dressed with hydrocolloid or hydrogel used together with an occlusive dressing e.g., polyurethane film. (D / 4; JBI, 1997) Sloughy Wound Wounds with slough should be dressed with a hydrocolloid, hydrogel, or alginate dressing. (D / 4; Bergstrom et al., 1994; JBI, 1997) Granulating Cavity Wound Cavity wounds should be loosely packed with non-adherent dressings. (D / 4; Bergstrom et al., 1994)
RNAO (2002)	Ulcer Management <u>Debridement</u> Select the method of debridement most appropriate to: • The client's condition and goals of treatment • Type, quantity, and location of necrotic tissue • Depth and amount of fluid (Strength of Evidence = C) Sharp debridement should be used if there is urgent need for debridement, as with advancing cellulitis or sepsis. (Strength of Evidence = C) Vascular assessment (e.g., Ankle/Brachial Pressure Index, Toe Pressure) is recommended for ulcers in lower extremities prior to debridement to rule out vascular compromise. (Strength of Evidence = C) Foot ulcers with dry eschar need not be debrided if they do not have edema, erythema, fluctuance, or drainage. Assess these wounds daily to monitor for pressure ulcer complications that would require debridement. (Strength of Evidence = C)

	Prevent or manage pain associated with debridement. Consult with a member of the health care team with expertise in pain management, when appropriate. (Strength of Evidence = C) <u>Wound Cleansing</u> Do not use skin cleansers or antiseptic agents (e.g., povidone iodine, iodophor, sodium hypochlorite solution, hydrogen peroxide, acetic acid) to clean ulcer wounds. (Strength of Evidence = B) Use normal saline, Ringer's lactate, sterile water or non-cytotoxic wound cleansers to clean ulcer wounds. (Strength of Evidence = C) Fluid used for cleansing should be warmed at least to room temperature. (Strength of Evidence = B) Cleanse wounds at each dressing change. (Strength of Evidence = C) To reduce surface bacteria and tissue trauma, the wound should be gently irrigated with 100 to 150 milliliters of solution. (Strength of Evidence = C) Use enough irrigation pressure to enhance wound cleansing without causing trauma to the wound bed. Safe and effective ulcer irrigation pressures range from 4 to 15 psi. Pressure of 4 to 15 psi is achieved by using: • 35 milliliter syringe with a 19 gauge angiocath • Single-use 100 milliliter saline squeeze bottle (Strength of Evidence = B) <u>Dressings</u> Moisture-retentive dressings optimize the local wound environment and promote healing.

	(Strength of Evidence = A) Consider the following criteria for interactive dressings when selecting a dressing: • Maintains a moist environment • Controls wound exudate, keeping the wound bed moist and the surrounding intact skin dry • Provides thermal insulation and wound temperature stability • Protects from contamination of outside micro-organisms • Maintains its integrity and does not leave fibers or foreign substances within the wound • Does not cause trauma to wound bed on removal • Is simple to handle, and is economical of costs and time (Strength of Evidence = B/C) Consider caregiver time when selecting a dressing. (Strength of Evidence = A) When selecting a dressing consider: • Etiology of the wound • Client's general health status, goals of care and environment • Site of the wound • Size of the wound, including depth and undermining • A dressing that will loosely fill wound cavity • Exudate: type and amount • Risk of infection • Type of tissue involved • Phase of the wound healing process • Frequency of the dressing change • Comfort and cosmetic appearance • Where and by whom the dressing will be changed • Dressing availability (Strength of Evidence = C) Monitor dressings applied near the anus, since they are difficult to keep intact. Consider use of special sacral-shaped dressings. (Strength of Evidence = B)
UIGN (2002)	Description of Intervention • Remove necrotic tissue with sharp, mechanical, autolytic, or enzymatic debridement. Autolytic and enzymatic debridement methods generally are specific to necrotic tissue and do not harm healthy tissue. However, they may be slow

	to debride the necrotic tissue. Sharp debridement is the most expedient at removing devitalized tissue, but does require specially trained personnel to perform (Bale & Harding, 1990; Barrett & Klibanski, 1973; Bryant, 2000; Longe, 1986; Michocki & Lamy, 1976) (Evidence Grade = C). • Cleanse with normal saline or commercially prepared wound cleanser at each dressing change. For the majority of wounds, isotonic saline is adequate to cleanse the wound surface. In those instances when the wound surface is more heavily laden with surface debris, a commercial wound cleanser may be used. Healing cannot occur until all inflammatory foreign material is removed (Bryant, 2000; Bryant et al., 1984; Foresman et al., 1993; AHCPR, 1994) (Evidence Grade = C). • Use enough irrigation pressure to cleanse wound without causing trauma. Safe and effective ulcer irrigation pressures range from 4 to 15 pounds per square inch (psi). (Refer to Appendix C in the original guideline document for details on delineation of irrigation pressures for various devices) (Brown et al., 1978; Green et al., 1971; Gross, Cutright, & Bhaskar, 1972; Hamer et al., 1975; Stevenson et al., 1976; Longmire, Broom, & Burch, 1987; Rodeheaver et al., 1975; Bhaskar, Cutright, & Gross, 1969; Wheeler et al., 1976) (Evidence Grade = B). • Avoid use of antiseptics (e.g., povidone iodine, iodophor, Dakin's solution, hydrogen peroxide, acetic acid) (Custer et al., 1971; Johnson, White, & McAnalley, 1989; Rodeheaver et al., 1980; Rydberg & Zederfeldt, 1968) (Evidence Grade = B). • Apply dressings that maintain a moist wound environment. Examples of moist dressings include, but are not limited to, hydrogels, hydrocolloids, saline moistened gauze, transparent film dressings. The ulcer bed should be kept continuously moist (Kurzuk-Howard, Simpson, & Palmieri, 1985; Fowler & Goupil, 1984; Gorse & Messner, 1987; Sebern, 1986; Alm et al., 1989; Colwell, Foreman, & Trotter, 1993; Neill et al., 1989; Oleske et al., 1986; Xakellis & Chrischilles, 1992) (Evidence Grade = B). • Keep the surrounding (periwound) intact skin dry while keeping the ulcer bed moist.
WOCN (2003)	Interventions: Treatment • Cleanse the wound at each dressing change with a noncytotoxic cleanser, minimizing trauma to the wound. Level of evidence = C. • Consider the use of high-pressure irrigation to remove slough or necrotic tissue. • Debride the ulcer of devitalized tissue. Level of evidence =

	C. • Do not debride dry, black eschar on heels that are nontender, nonfluctuant, nonerythematous and nonsuppurative. Level of evidence = C. • Perform wound care using topical dressings determined by wound, patient needs, cost, caregiver time, and availability. Level of evidence = C. • Choose dressings that provide a moist wound environment, keep the periwound skin dry, control exudates, and eliminate dead space. Level of evidence = C. • Reassess the wound with each dressing change to determine whether modifications are needed as the wound heals or deteriorates. Level of evidence = C.
Infection Management	
AMDA (1996 reviewed 2003)	Treatment • Evaluate the ulcer(s) for infection. If purulent drainage is present, consider osteomyelitis or an abscess. Consider cellulitis if advancing inflammation is noted more than 1 cm from the edge of the wound. Obtain deep tissue biopsy cultures if needed, since swab or drainage cultures are poorly correlated with the underlying infectious organisms. Use systemic antibiotics only when there is evidence of a systemic infection, such as cellulitis, osteomyelitis, or sepsis; otherwise, systemic antibiotics are not ordinarily indicated in the management of pressure ulcers. • Use appropriate infection control techniques including standard precautions for body substances, clean gloves for each patient, treating the most contaminated wound last on each individual patient, and washing hands between patients. Always use sterile instruments for debridement. Use clean dressings, rather than sterile ones, as long as dressing procedures comply with institutional infection-control guidelines, and discard soiled dressings according to relevant regulations. • For wounds that are not responding to appropriate treatment, several alternative regimens may be considered. If a clean wound fails to respond to a two- to four-week course of appropriate therapy, topical antibiotic ointments or solutions may be added for a two-week trial. The antibiotic should be effective against gram-negative, gram-positive, and anaerobic organisms.
AMDA (1999 reviewed 2004)	Identify priorities in managing the wound and the patient It is important to describe any bacterial presence accurately, as a

	basis for proper management. Do not describe colonization or contamination as "infection" unless there is evidence of tissue invasion or impaired wound healing due to bacterial presence. Treatment Manage local infection • Obtain an appropriate tissue culture if needed to help with diagnosis or treatment when evidence (erythema, edema, malodorous drainage, fluctuance, or induration) of a soft tissue infection (cellulitis, abscess, osteomyelitis, etc.) is present. • Confirm suspected bone or joint infections via radiographic evaluation or biopsy. • Swab cultures of the wound surface are not recommended because they cannot differentiate infection from contamination or colonization. • Health care practitioners should not prescribe systemic antibiotics based solely on a report of a positive culture. • Use standard infection control techniques to manage and debride wounds (see AMDA and AHCPR Pressure Ulcer Clinical Practice Guidelines). • Cover the wound at all times except during treatments, and follow other recommended procedures. These should include 1) standard (also called "universal") precautions for all patients, with or without wounds, and 2) contact precautions based on the presence of infection, the number and size of wounds, the amount of drainage, and the ease of containing potentially infectious materials. Cleanse and remove dead tissue from the wound. • Before using a topical treatment, consider whether another approach to debridement, cleansing, or dressing may be indicated. For a non-healing ulcer or for an ulcer with a significant odor, despite 2 to 4 weeks of optimal use of other measures (cleansing, debridement, dressing, etc.), a topical antibacterial ointment may be appropriate for a limited period.
CSCM (2000 reviewed 2005)	<u>Treatment</u> Nonsurgical Topical antibiotics may be used if routine measures do not result in wound healing after several weeks. Broad spectrum agents, such as 1 percent silver sulfadiazine cream, may be used, although cross-sensitivity to other sulfonamides may occur.

	Mupirocin calcium cream 2 percent may be applied for pressure ulcers infected with Staphylococcus aureus and Streptococcus pyogenes. Prolonged use may result in overgrowth of nonsusceptible microorganisms, including fungi.
	
	Preoperative Care
	
	• Assess, treat, and optimize the following factors preoperatively:
	  • Local wound infection
	  • Osteomyelitis
	
	(Scientific evidence: II, III, V; Grade of recommendation: C; Strength of panel opinion: Strong)
	
	<u>Complications of Pressure Ulcers</u>
	
	Nonsurgical
	
	• Identify the presence of tissue and/or bone infection.
	  • Obtain quantitative tissue and/or bone cultures in ulcers not responding to routine therapeutic measures.
	  • Obtain a tissue and/or bone biopsy to confirm infection, if necessary.
	
	(Scientific evidence: III, V; Grade of recommendation: C; Strength of panel opinion: Strong)
	
	• Management of cellulitis, osteomyelitis, and sepsis requires antibiotics.
	
	Surgical
	
	• Identify potential complications of surgical intervention, including:
	  • Wound dehiscence/wound separation
	  • Delayed infection and abscess
	  • Hematoma and seroma
	
	(Scientific evidence: None; Grade of recommendation: Expert consensus; Strength of panel opinion: Strong)

SINGAPORE MOH (2001)	No recommendations offered.
RNAO (2002)	Colonization and Infection

	The treatment of infection is managed by wound cleansing, systemic antibiotics, and debridement as needed. (Strength of Evidence = A) Protect pressure ulcers from sources of contamination, e.g., fecal matter. (Strength of Evidence = B) Follow Body Substance Precautions (BSP) or an equivalent system appropriate for the health care setting and the client's condition when treating pressure ulcers. (Strength of Evidence = C) Medical management may include initiating a two-week trial of topical antibiotics for clean pressure ulcers that are not healing or are continuing to produce exudate after two to four weeks of optimal patient care. The antibiotic should be effective against gram-negative, gram-positive, and anaerobic organisms. (Strength of Evidence = A) Medical management may include appropriate systemic antibiotic therapy for patients with bacteremia, sepsis, advancing cellulitis, or osteomyelitis. (Strength of Evidence = A) Use sterile instruments to debride pressure ulcers. (Strength of Evidence = C) To obtain wound culture, cleanse wound with normal saline first. Swab wound bed, not eschar, exudate, or edges. (Strength of Evidence = C) The use of cytotoxic antiseptics to reduce bacteria in wound tissue is not recommended. (Strength of Evidence = B)
UIGN (2002)	Description of Intervention • If the ulcer does not progress toward healing, the patient should be evaluated to determine if osteomyelitis is present. If diagnosed, the infection must be treated if the ulcer is to

	heal. • DO NOT USE SWAB CULTURES TO DIAGNOSE WOUND INFECTION because all pressure ulcers are colonized with bacteria (Bryant, 2000; Garner et al., 1988; Krizek & Robson, 1975; Rousseau, 1989; AHCPR, 1994) (Evidence Grade = C). • Consider a 2 week course of topical antibiotics for clean pressure ulcers that do not heal or continue to produce purulent exudate after 2 to 4 weeks of care as outlined in this protocol. The antibiotic should be effective against gram-negative, gram-positive, and anaerobic organisms (e.g., Iodosorb [Healthpoint], silver sulfadiazine, triple antibiotic, or silver impregnated dressings) (Bendy et al., 1964; Kucan et al., 1981) (Evidence Grade = B).
WOCN (2003)	Interventions: Treatment • Manage wound infections and differentiate between contamination, colonization, and infection. Level of evidence = C. • Obtain a quantitative culture or tissue biopsy if high levels of bacteria (>10^5) are suspected in a wound exhibiting clinical signs of infection such as absence of healing. • Use topical antibiotics in wounds cautiously and selectively. Level of evidence = C. • Consider use of topical antimicrobials if a high level of bacteria is present (>10^5). Level of evidence = C. • Use systemic antibiotics in the presence of bacteremia, sepsis, advancing cellulitis, or osteomyelitis. Level of evidence = C.
Management of Tissue Load	
AMDA (1996 reviewed 2003)	Treatment • Bed-bound patients should be repositioned every two hours if consistent with the overall patient goals. • Use appropriate positioning devices such as pillows or foam padding between the knees and ankles and avoid placing the patient on his or her trochanters or directly on the wound. • Maintain the lowest head elevation possible to relieve pressure and shear on the sacrum, heels, and elbows while being attentive to the patient's risk of aspiration. • Use lifting devices such as draw sheets or a trapeze, and try to prevent contractures. • When in a chair, assure proper body alignment and reposition every hour, or instruct the patient to relieve pressure on the seating surface every 15 minutes if

	consistent with the overall patient goals. • Seats should be padded with devices composed of foam, gel, or air cushions. • Do not use donut-shaped devices for pressure relief/reduction • Any individual assessed to be at risk for developing pressure ulcers should be placed when lying in bed on a pressure-reducing device, such as foam, static air, alternating air, gel, or water mattress. • Use a dynamic support surface (such as a low-airloss bed or an air-fluidized bed) if the patient cannot assume a variety of positions without bearing weight on a pressure ulcer, if skin moisture is a problem, or if the patient fully compresses the static support surface (bottoms out). • An air-fluidized bed is recommended for individuals with multiple truncal Stage 3 or 4 ulcers and for patients who have failed to heal on a low-airloss mattress.
AMDA (1999 reviewed 2004)	Treatment Reduce pressure as needed. • Turn and position the patient often enough to relieve pressure on the wound and try to protect uninvolved areas. • Have a turning and positioning schedule of approximately every two hours when the patient is awake, and possibly every two hours while he or she sleeps. • Document (by flow sheet, Kardex, etc.) when turning and positioning occurs. • Review proper techniques for turning and positioning with all caregivers and staff involved in patient care. • Use positioning devices to try to position ulcerated areas off of the support surface (see AMDA and AHCPR Pressure Ulcer Clinical Practice Guidelines). • Document any problems caregivers encounter getting patients to understand or cooperate with treatments. • Adjust the head of the bed so that it is as low as possible (preferably lower than a 30 percent incline) to reduce friction forces on the body. • Document when conditions or risk factors such as aspiration risk, the presence of contractures, a patient's inability to cooperate, or other problems affect the desired positioning. • A pressure-reduction device may be needed when turning and positioning alone cannot achieve adequate pressure reduction. Consider the use of support surfaces to help reduce pressure on three levels. Level 1 pressure reduction, the use of an overlay or static (non-powered) pressure reducing mattress that is at least four inches thick (e.g., foam overlay or gel mattress), should suffice for most patients with at least two intact turning surfaces (front, back,

	and each side). • If health care practitioners and caregivers cannot implement simple measures to try to relieve pressure on an existing ulcer or to prevent the occurrence of new ulcers, if new breakdown sites develop despite such measures, or if the patient has fewer than two intact turning surfaces, consider a Level 2 pressure reduction device such as a dynamic (e.g., alternating pressure) mattress that can be placed directly on a hospital bed frame and inflated to a height of at least five inches. • For more complex wounds or to treat patients for whom Level 2 approaches are unsuccessful, a Level 3 approach (e.g., low-air loss or an air-fluidized bed) may be necessary. • Select chair and wheelchair cushion devices carefully, based on the individual's size and postural needs, to optimize sitting posture and reduce pressure. • Reposition the sitting individual off of pressure points approximately every hour, or teach the patient who can cooperate to reposition himself or herself approximately every 15 minutes. • Document when the patient is unable or unwilling to cooperate with the plan.
CSCM (2000 reviewed 2005)	Support Surfaces and Positioning for Managing Tissue Loads <u>Bed Positioning</u> Use bed-positioning devices and techniques to prevent and treat pressure ulcers. Use devices and techniques that are compatible with the bed type and the individual's health status. • Avoid positioning individuals directly on a pressure ulcer. • Avoid positioning individuals directly on the trochanter • Use cushions and positioning aids to relieve pressure on pressure ulcers or vulnerable skin areas by elevating them away from the support surface. • Avoid close cutouts or donut-type cushions • Prevent contact between bony prominences. • Limit the amount of time the head of the bed is elevated • Develop, display, and use an individualized positioning regimen and repositioning schedule. (Scientific evidence: II, V; Grade of recommendation: B, C; Strength of panel opinion: Strong) <u>Bed Support Surfaces</u> Use pressure-reducing bed support surfaces for individuals who

	are at risk for or who have pressure ulcers.
	
	• Select a static support surface for individuals who can be positioned without weight bearing on an ulcer and without bottoming out on the support surface.
	• Select a dynamic support surface if the individual cannot be positioned without pressure on an ulcer, when a static support surface bottoms out, if there is no evidence of ulcer healing, or if new ulcers develop.
	• Use low-air loss and air-fluidized beds in the treatment of pressure ulcers if one or more of the following conditions exist:
	  • Pressure ulcers on multiple turning surfaces
	  • Compromised skin temperature and moisture control in the presence of large stage III or IV pressure ulcers
	
	(Scientific evidence: I, II, V; Grade of recommendation: A, B, C; Strength of panel opinion: Strong)
	
	<u>Wheelchair Positioning</u>
	
	Prescribe wheelchairs and seating systems according to individualized anthropometric, ergonomic, and functional principles.
	
	• Obtain specific body measurements for optimal selection of seating system dimensions.
	• Measure the effects of posture and deformity on interface pressure distribution.
	• Prescribe a power weight-shifting wheelchair system for individuals who are unable to independently perform an effective weight shift.
	• Use clinical judgment as well as objective data in determining the compatibility of the individual's shape with the seating system.
	
	(Scientific evidence: II, III, V; Grade of recommendation: B, C; Strength of panel opinion: Strong)
	
	Evaluate the individual's postural alignment, weight distribution, balance, stability, and pressure reduction capabilities to establish a proper sitting schedule.
	
	• Avoid positioning the wheelchair-seated individual directly on a pressure ulcer.
	• Allow limited sitting in individuals capable of performing weight shifts every 15 minutes.
	• Reposition the wheelchair-seated individual at least every hour; if this is not possible and the individual is unable to

	perform weight shifts, return the individual to bed. (Scientific evidence: II, III; Grade of recommendation: B, C; Strength of panel opinion: Strong) <u>Wheelchair Support Surfaces</u> Use appropriate wheelchair cushions with all individuals with spinal cord injury. • Inspect and maintain all wheelchair cushions at regularly scheduled intervals. (Scientific evidence: II, V; Grade of recommendation: B, C; Strength of panel opinion: Strong)
SINGAPORE MOH (2001)	No recommendations offered.
RNAO (2002)	Positioning and Support Surfaces Refer patients at RISK to appropriate interdisciplinary team members (Occupational Therapist, Physiotherapist, Enterostomal Therapist, etc) with expertise in seating. Postural alignment, distribution of weight, balance, stability, and pressure relief when positioning sitting individuals must be considered. Ensure support surfaces are used appropriately and are properly maintained. (Strength of Evidence = C) Assess all patients with EXISTING PRESSURE ULCERS to determine their risk for developing additional pressure ulcers using the "Braden Scale for Predicting Pressure Sore Risk." If the client remains at risk, use a pressure-reducing surface. (Strength of Evidence = C) If the patient remains at risk for other pressure ulcers, a high specification foam mattress instead of a standard hospital mattress should be used to prevent pressure ulcers in moderate to high risk patients. (Strength of Evidence = A) Use a static support surface if the patient can assume a variety of positions without bearing weight on a pressure ulcer and without "bottoming out."

	(Strength of Evidence = B) Use a dynamic support surface if: • The patient cannot assume a variety of positions without bearing weight on a pressure ulcer • The patient fully compresses the static support surface • The pressure ulcer does not show evidence of healing (Strength of Evidence = B) Use pressure relief for clients in the Operating Room to reduce the incidence of pressure ulcers post operatively. (Strength of Evidence = B) Obtain a seating assessment if a client has a pressure ulcer on a sitting surface that requires relief from pressure or repositioning. (Strength of Evidence = C) A client who has a pressure ulcer on a seating surface should avoid sitting. If pressure on the ulcer can be relieved, limited sitting may be allowed. (Strength of Evidence = C)
UIGN (2002)	Treatment of pressure ulcers should center on the following intervention activities: • Management of tissue loads (i.e., pressure, friction, and shearing). For further information regarding this type of management, please see the NGC summary of the UIGN guideline Prevention of Pressure Ulcers, and the NGC synthesis Pressure Ulcer Prevention.
WOCN (2003)	Interventions: Treatment • Reduce friction and shear. Level of evidence = C. • Turn patient every 2 hours. Level of evidence = C. • Utilize positioning devices to avoid placing patient on an ulcer. Level of evidence = C. • Maintain the head of the bed at 30 degrees elevation for supine positions and 30 degrees or less for side-lying. Level of evidence = C. • Use pressure relief such as low air loss or air-fluidized mattresses/beds for individuals with Stage III or IV ulcers or those with multiple ulcers over several turning surfaces.

	Level of evidence = A. • Shift weight for chair-bound individuals every 15 minutes; if patient cannot perform shifts, caregivers should reposition every hour. Level of evidence = C. • Limit time in chair and use pressure-relief chair cushions in the presence of pressure ulcers on sitting surfaces. Level of evidence = C. • Manage fecal and urinary incontinence. Level of evidence = C. • Select underpads, diapers, or briefs that are absorbent to wick effluent away from the skin. Level of evidence = C.
Pain Management	
AMDA (1996 reviewed 2003)	Treatment • Use adequate pain control measures, including additional dosing at times of debridement or dressing changes, if indicated. Address psychological issues that may affect either the patient or his or her family, and treat depression. It is important to establish goals consistent with the values and lifestyle of the individual and his or her family. For example, for terminal patients who are in pain when they move, avoiding pain may be a higher priority than the prevention or management of the pressure ulcer(s).
AMDA (1999 reviewed 2004)	Identify priorities in managing the wound and the patient. • Significant pain related to the wound itself, the treatments, or other unrelated factors may make pain management a priority. Use a standardized pain assessment tool that is not specific to wound care to assess and monitor pain (for example, the 1999 AMDA guideline on chronic pain management). • After assessing pain and defining its characteristics (frequency, intensity, possible aggravating factors, etc.) and causes, treat it aggressively, using appropriate pain management protocols. • Consider changing approaches to debriding or dressing the wound if pain is significant during these procedures.
CSCM (2000 reviewed 2005)	No recommendations offered.

SINGAPORE MOH (2001)	Pain Pain Management Pain assessment and pain relief should be a high priority. (D/4; JBI, 1997)
RNAO (2002)	Pain Assess all patients for pain related to the pressure ulcer or its treatment. (Strength of Evidence = C) Assess location, frequency, and intensity of pain to determine the presence of underlying disease, the exposure of nerve endings, efficacy of local wound care and psychological need. (Strength of Evidence = B) Debridement Prevent or manage pain associated with debridement. Consult with a member of the health care team with expertise in pain management, when appropriate. (Strength of Evidence = C) The successful management of pain is a complex interdisciplinary effort requiring a multifacted treatment plan, the discussion of which is beyond the scope of this guideline. See the NGC summary of the RNAO best practice guideline Assessment and Management of Pain.
UIGN (2002)	No recommendations provided.
WOCN (2003)	Implement measures to eliminate or control pain. Level of evidence = C. • Turn and reposition patient off ulcer(s). • Use appropriate support surfaces • Use appropriate analgesics to treat procedure-related as well as chronic pain (e.g., premedicate as needed prior to dressing change, debridement) • Refer to pain clinic for chronic pressure ulcer pain
Nutrition and Hydration	

AMDA (1996 reviewed 2003)	Treatment • Assure adequate nutrition and hydration. Anorexia should be thoroughly investigated in patients with a recent change in intake. • For those already undernourished, nutritional replenishment and support should be targeted to approximately 35 ± 5 calories/kg/day with protein supplementation to 1.25 to 2.00 g/kg/day. Strive for hydration at >33 mL/kg/day, and adjust to the clinical situation to assure a urinary output of at least 50 mL/hr. • Use vitamin and mineral supplements if deficiencies are confirmed or suspected.
AMDA (1999 reviewed 2004)	Treatment Provide General Support for the Patient <u>Hydration and nutrition</u> • Define a patient's hydration and nutrition status as soon as possible. • Encourage fluids unless they are contraindicated for some reason, especially if the patient is on an air-fluidized bed. • Begin to rehydrate a moderately or severely dehydrated patient promptly. • Nutritional deficits or risks should be addressed in a stepwise fashion, based on the presence of weight loss or undernutrition, identification of contributing factors, and overall care objectives. • Address weight loss or undernutrition within several days of the onset of a wound, if these conditions are not already being addressed. • Use appropriate protocols for managing unplanned weight loss or nutritional risks, tailored to each patient's needs. • Calorie, protein, and vitamin supplementation often are important but are not automatically required. Tailor any supplementation to a patient's specific needs, condition, and prognosis. • For more urgent situations, diet orders may be obtained directly from a physician and should be followed up by a physician or dietitian within a week. <u>Psychosocial support</u> • Identify and treat significant depression to maximize eating and patient participation in treatment and rehabilitative efforts.

CSCM (2000 reviewed 2005)	Nutrition
	
	• Assess nutritional status of all spinal-cord injury individuals on admission and as needed, based on medical status, including:
	  • Dietary intake
	  • Anthropometric measurements
	  • Biochemical parameters (prealbumin, total protein, albumin, hemoglobin, hematocrit, transferrin, and total lymphocyte count)
	
	(Scientific evidence: II, III, V; Grade of recommendation: B, C; Strength of panel opinion: Strong)
	
	• Provide adequate nutritional intake to meet individual needs, especially for:
	  • Calories (or energy)
	  • Protein
	  • Micronutrients (zinc, vitamin C, vitamin A, and vitamin E)
	  • Fluids
	
	(Scientific evidence: II, III, V; Grade of recommendation: B, C; Strength of panel opinion: Strong)
	
	• Implement aggressive nutritional support measures if dietary intake is inadequate or if an individual is nutritionally compromised.
	
	(Scientific evidence: II; Grade of recommendation: B; Strength of panel opinion: Strong)

SINGAPORE MOH (2001)	Nutrition Nutritional Assessment Healthcare providers should do baseline and ongoing assessment of nutritional status, appropriate interventions, and evaluation of the effectiveness of medical nutritional therapy. (D/4; Bergstrom et al., 1994)
RNAO (2002)	Nutrition Assessment and Management Ensure adequate dietary intake to prevent malnutrition or replace existing deficiencies to the extent that this is compatible with the individual's wishes. (Strength of Evidence = B)

	Prevent clinical nutrient deficiencies by ensuring that the patient is provided with optimal nutritional care through one or more of the following: (Strength of Evidence = C) • Consultation with a registered dietitian for assessment • Consultation with a speech language pathologist for swallowing assessment • A varied, balanced diet to meet clinical needs for healing and co-existing diseases e.g. renal failure and diabetes • Nutritional supplements if needed • Multivitamin and mineral preparations • Enteral tube feeding • Parenteral nutrition (Strength of Evidence = B) • Ongoing monitoring of nutritional intake, laboratory data and anthropometric data
UIGN (2002)	Description of Intervention Ensure adequate dietary intake to enhance healing. Request a consult from a dietitian and develop a nutrition plan. The stage of the wound is correlated with the severity of nutritional deficits, especially low protein intake or a below-normal serum albumin (Allman et al., 1986; Bergstrom & Braden, 1992; Berlowitz & Wilking, 1989; Breslow, Hallfrish, & Goldberg, 1991; Ek, Unosson, & Bjurulf, 1989; Hanan & Scheele, 1991; Holmes et al., 1987; Pinchcofsky-Devin & Kaminski, 1986) (Evidence Grade = B). Also check to make sure that teeth are in good condition or dentures fit properly (Evidence Grade = B).
WOCN (2003)	Interventions: Treatment Ensure adequate nutrient and fluid intake to maximize the potential for wound healing: 35 to 40 kcalories per kg of body weight/day for total calories and 1.0 to 1.5 g protein/kg of body weight/day for total protein. Level of evidence = C.
Surgical Intervention	
AMDA (1996 reviewed 2003)	Treatment • Depending on the stage and extent of the ulcer and other comorbid conditions, the team may consider obtaining the help of consultants (including "Surgical: General, plastics, vascular, and orthopedic"; see Table 4 in original guideline document). • Occasionally, it may be necessary to consider transferring the patient with a pressure ulcer to another site (e.g.,

	subacute care sites) for services that go beyond the capabilities of the nursing facility. Examples include extensive surgical debridement, surgical repair, management of systemic complications, comfort and pain management, and specialized diagnostic studies.
AMDA (1999 reviewed 2004)	Monitoring Decide whether to change approaches to managing the wound. <u>Adjunctive therapies</u> The physician may consider a surgical intervention (e.g., graft or flap) when a clean, uncomplicated Stage 3 or 4 wound does not respond to standard treatments. Base the decision to offer surgery on such factors as the patient's overall burden of illness and prognosis, care goals, and the expected functional outcomes.
CSCM (2000 reviewed 2005)	Reassessment <u>Surgical</u> Refer appropriate individuals with complex, deep stage III pressure ulcers (i.e., undermining, tracts) or stage IV pressure ulcers for surgical evaluation. When surgery is indicated, include the following tenets of surgical treatment: • Excising of ulcer, surrounding scar, bursa, soft tissue calcification, and underlying necrotic or infected bone • Filling dead space, enhancing vascularity of the healing wound, and distributing pressure off the bone • Resurfacing with a large regional pedicle flap, with suture line away from the area of the direct pressure, and one that does not encroach on adjacent flap territories • Preserving options for future potential breakdowns (Scientific evidence: V; Grade of recommendation: C; Strength of panel opinion: Strong) Preoperative Care Assess, treat and optimize the following factors preoperatively: • Local wound infection • Nutritional status • Bowel regulation • Severe spasm and contractures

	• Comorbid conditions • Previous ulcer surgery • Smoking • Osteomyelitis • Urinary tract infection • Heterotopic ossification (Scientific evidence: II, III, V; Grade of recommendation: B, C; Strength of panel opinion: Strong) Postoperative Care Be cognizant of postoperative care procedures. • Position the individual in a manner that keeps pressure off a fresh surgical site. • Use an air-fluidized bed when pressure on the surgical flap is unavoidable. • Progressively mobilize the individual to a sitting position over at least 4 to 8 weeks to prevent reinjury of the ulcer or surgical site. • Provide subsequent patient education on pressure management and skin inspection. (Scientific evidence: V; Grade of recommendation: C; Strength of panel opinion: Strong) Complications of Pressure Ulcers <u>Surgical</u> Identify potential complications of surgical intervention, including: • Wound dehiscence/wound separation • Delayed infection and abscess • Hematoma and seroma (Scientific evidence: None; Grade of recommendation: Expert consensus; Strength of panel opinion: Strong)
SINGAPORE MOH (2001)	No recommendations offered.
RNAO (2002)	Operative Repair of Pressure Ulcers Possible candidates for operative repair are medically stable, adequately nourished, and are able to tolerate operative blood

	loss and postoperative immobility. Quality of life, patient preferences, treatment goals, risk of recurrence, and expected rehabilitative outcome are additional considerations. (Strength of Evidence = C)
UIGN (2002)	No recommendations offered.

WOCN (2003)	Interventions: Treatment
	
	Evaluate the need for operative repair for patients with Stage III and IV ulcers who do not respond to conservative therapy. Level of evidence = C.
	
	• Prior to surgery, the patient should be in an optimal state, and factors associated with impaired healing should be controlled
	• Operative procedures include direct closure, skin grafts, and flaps.
	  ◦ A two-stage procedure with separation of wound debridement from the reconstruction is preferable
	  ◦ Types of flaps used to cover pressure ulcers include fasciocutaneous and myocutaneous flap. The fasciocutaneous flap reportedly provides a better long-term result in surgical reconstruction of pressure ulcers than the myocutaneous flap.
	• Postoperatively, the operated region must be relieved of pressure with gradual increase in tissue load, and the patient rehabilitated and educated in self-investigation, pressure relief, nutrition and prophylaxis. There is limited evidence supporting the use of either flotation mattresses or air-fluidized beds for post-operative patients.
	• Surgical reconstructive options for individuals with recurrent Stage III or IV ulcers or multiple pressure ulcers may be limited because of previous surgeries, a shortage of available tissue, and impaired vascularity of the area (Niazi, Salzberg, Bryne, & Viehbeck, 1997). Some patients may not be surgical candidates because of malnutrition, immobility, lack of compliance with treatment regimens, and other chronic diseases
	• Rates of surgical complications and recurrence are high.
	• The risk/benefit of surgery must be discussed with the patient/caregivers.

Adjuvant Therapy	
AMDA (1996	Treatment

reviewed 2003)	For wounds that are not responding to appropriate treatment, several alternative regimens may be considered. Consider a course of electrotherapy for non-responding Stage 3 and 4 ulcers, or for recalcitrant Stage 2 ulcers.
AMDA (1999 reviewed 2004)	Monitoring Decide whether to change approaches to managing the wound. <u>Adjunctive therapies</u> Electrical stimulation has been shown to be marginally effective, although it may not be covered by insurance. Regenerative growth factors have been helpful for some chronic non-healing wounds, although approval by the FDA for treating pressure ulcers is pending. Other adjunctive measures have no proven benefit or advantage over more standard approaches.
CSCM (2000 reviewed 2005)	Treatment <u>Nonsurgical</u> Electrical Stimulation Use electrical stimulation to promote closure of stage III or IV pressure ulcers combined with standard wound care interventions. (Scientific evidence: I, II; Grade of recommendation: A; Strength of panel opinion: Strong) <u>Adjunctive Therapies</u> Literature reviews were done for several adjunctive wound therapies, including those that used physical forms of energy, such as ultraviolet radiation, low-energy laser radiation, normothermia, ultrasound, subatmospheric pressure therapy, hyperbaric oxygen, topical agents, cytokine growth factors, and nonantibiotic systemic drugs. These reviews did not provide sufficient supporting evidence to justify recommending them for the treatment of pressure ulcers in individuals with spinal cord injury.
SINGAPORE MOH (2001)	No recommendations offered.

RNAO (2002)	Adjunctive Therapies Refer to physiotherapy for a course of treatment with electrotherapy for Stage III and IV pressure ulcers that have proved unresponsive to conventional therapy. Electrical stimulation may also be useful for recalcitrant Stage II ulcers. (Strength of Evidence = A) Chronic pressure ulcers may be treated by: • Electrical stimulation (Strength of Evidence = A) • Vacuum assisted closure and normothermic therapies (Strength of Evidence = B) • Therapeutic ultrasound (Strength of Evidence = B) • Ultraviolet light (Strength of Evidence = B) • Pulsed electromagnetic fields (Strength of Evidence = B) • Growth factors and skin equivalents (Strength of Evidence = C)
UIGN (2002)	Adjuvant wound therapies such as hyperbaric oxygenation, negative pressure wound therapy, and electrical stimulation may be considered on an individual basis for those wounds that do not respond to more traditional therapies and osteomyelitis has been ruled out (Bryant, 2000) (Evidence Grade = C).
WOCN (2003)	Interventions: Treatment Consider adjunctive therapies to enhance the healing of recalcitrant Stage III and IV wounds such as: • Growth Factors--platelet-derived growth factor-BB (rPDGF-BB). Level of evidence = A. • Electrical stimulation. Level of evidence = A. • Noncontact normothermic radiant heat therapy. Level of evidence = A. • Topical negative pressure (i.e., vacuum-assisted wound closure). Level of evidence = A.
Reassessment and Ongoing Care	
AMDA (1996 reviewed 2003)	• Ongoing management involves the same procedures and steps as described above, but should be tailored to the wound as it evolves. Monitoring

	• Regular re-evaluations to assess healing may be based on AHCPR Assessment Guide to monitor the success of the treatment regimen. (See Appendix 2 in the original guideline document.) • Only document the progress of healing by improvement in wound characteristics. Do not use the pressure ulcer staging system in reverse. • Follow-up diagnostic testing and consultation are important. • Monitor the timeliness of analysis and reporting of skin conditions, and obtaining supplies, and the appropriateness, timeliness, and consistency of treatment. • Documentation should reflect the status of the wound healing and contributory factors, and should be done at least at each regularly scheduled visit while ulcers are present. • Risks identified through the Braden Scale, the Minimum Data Set (MDS), and the Resident Assessment Protocol (RAP) should be correlated with the implementation of preventive measures and with actual ulcer development.
AMDA (1999 reviewed 2004)	Monitoring Monitor progress of the wound and the patient. • In addition to nursing assistants and direct care nurses, physicians and other practitioners must periodically monitor the progress of wound healing and the patient's overall condition. • Some reassessment should be done at least weekly, or more often if the wound worsens or complications develop. A nurse should complete a thorough assessment of the patient and the wound as a basis for communicating with the attending physician. The physician should be kept aware of the progress of all wounds. He or she should examine complicated or non-healing ulcers periodically. • Document the wound's progress and characteristics with one of the aforementioned wound assessment tools. (Refer to original guideline document for wound assessment tools). Recognize and manage wound complications. • The nursing staff, physician, and others should monitor the patient for possible complications, such as increasing necrosis of the ulcer base, necrosis of the wound edges, cellulitis or contact dermatitis of the surrounding skin, and increasing amount of odor and exudate from the wound. • The physician or nurses should document pertinent positives (the presence of such complications) and pertinent negatives (absence of complications). • Address complications by modifying the care plan accordingly, using the same steps as for initial assessment

	and management. Decide whether to change approaches to managing the wound. • Reassess current treatment measures to ensure that they are being done properly and that they are still needed. • Use a step-wise approach to deciding whether and how to change treatments. First, address complications such as cellulitis, osteomyelitis, and underlying necrotic tissue. Next, review the patient's nutrition and hydration status to ensure it is still adequate, i.e., the patient is getting enough calories to at least stabilize weight, at least 1.2 to 1.5 g/kg/day of protein, and there are no significant fluid and electrolyte imbalances. • The aforementioned measures should be tried before deciding to add or change to an adjunctive therapy.
CSCM (2000 reviewed 2005)	Reassessment Monitor and assess the pressure ulcer on a consistent, ongoing basis to determine the adequacy of the plan of care. • Monitor the pressure ulcer at each dressing change. • Document ulcer assessment at least weekly and every time the condition of the pressure ulcer or the individual changes. (Scientific evidence: None; Grade of recommendation: Expert consensus; Strength of panel opinion: Strong) Modify the treatment plan if the ulcer shows no evidence of healing within 2 to 4 weeks. • Review individual risk factors when assessing the healing of pressure ulcers. • Evaluate healing progress using an instrument or other quantitative measurements. (Scientific evidence: I, V; Grade of recommendation: A, C; Strength of panel opinion: Strong) Complications of Pressure Ulcers <u>Nonsurgical</u> • Identify the potential complications of immobility associated with pressure ulcer management and implement preventive and therapeutic measures for:

	• Nutritional deficiencies and dehydration • Decreased range of motion • Deconditioning (cardiopulmonary, cardiovascular, and musculoskeletal) (Scientific evidence: III, V; Grade of recommendation: C; Strength of panel opinion: Strong) • Manage hypergranulation tissue that may impede ulcer healing. (Scientific evidence: V; Grade of recommendation: C; Strength of panel opinion: Strong) • Identify the potential psychosocial impacts of pressure ulcers and immobility and provide referral for therapeutic interventions based upon the individual's characteristics and circumstances. Refer to appropriate resources for problem resolution, including: • Vocational rehabilitation services • Peer counseling and support groups • Formal psychotherapy and/or family therapy (Scientific evidence: III, V; Grade of recommendation: C; Strength of panel opinion: Strong) <u>Surgical</u> • Identify potential complications of surgical intervention, including: • Wound dehiscence/wound separation • Delayed infection and abscess • Hematoma and seroma (Scientific evidence: None; Grade of recommendation: Expert consensus; Strength of panel opinion: Strong)
SINGAPORE MOH (2001)	Assessment Re-assessment A pressure ulcer should be re-assessed at least once a week or when the condition of the patient or wound deteriorates. (D/4; Bergstrom et al, 1994; JBI, 1997)
RNAO (2002)	Pressure Ulcer Assessment Reassess ulcers at least weekly to determine the adequacy of the

	treatment plan. (Strength of Evidence = C) Discharge/Transfer of Care Arrangements Clients moving between care settings should have the following information provided: • Risk factors identified • Details of pressure points and skin condition prior to transfer • Need for pressure reducing/relieving equipment • Need for pressure relieving mattresses, seating, special transfer equipment • Details of healed ulcers • Stage, site and size of existing ulcers • History of ulcers, previous treatments and dressings (generic) used • Type of dressing currently used and frequency of change • Any allergies to dressing products • Need for on-going nutritional support (Strength of Evidence = C) Use the Registered Nurses Association of Ontario (RNAO) best practice guideline Risk Assessment and Prevention of Pressure Ulcers (see the NGC summary of the RNAO guideline and the NGC synthesis Pressure Ulcer Prevention). (Strength of Evidence = C)
UIGN (2002)	• After initial treatment of pressure ulcers begins, the size of the ulcer may increase, especially when the ulcer initially contains necrotic tissue. However, the ulcer should become clearer and cleaner despite the increase in size. The treatment simply exposes more of the ulcer, thereby leading to the increased size. If the ulcer increases in size and does not become cleaner and clearer, then the treatment needs to be altered, as the ulcer is not healing appropriately. • Protect from further injury to the ulcer or additional ulcer formation by utilizing interventions outlined for patients at risk. • For further information regarding this type of management, please see the NGC summary of the UIGN guideline Prevention of Pressure Ulcers. Also see the NGC guideline synthesis Pressure Ulcer Prevention. • Reassess pressure ulcers weekly. If the condition of the patient or the wound deteriorates, reevaluate as soon as noted. Use the Pressure Ulcers Assessment Guide (see

	Appendix B in the original guideline document) to track the healing progress of the ulcer.
WOCN (2003)	Interventions: Treatment Monitor vigilantly for recurrence of any pressure ulcers, and emphasize to patients and families that measures to prevent and manage pressure ulcers are lifelong endeavors. Level of evidence = C.

TABLE 3: BENEFITS AND HARMS	
Benefits	
AMDA (1996 reviewed 2003)	• Prevent the formation of pressure ulcers • Reduce the size, width, and/or depth of the pressure ulcer • Improve quality of life • Reduce mortality associated with pressure ulcers
AMDA (1999 reviewed 2004)	• Prevent suffering due to pressure ulcers in the long-term care setting. • Improve quality of life for patients with pressure ulcers in the long-term care setting.
CSCM (2000 reviewed 2005)	The benefits of clinical practice guidelines for the spinal cord medicine practice community are numerous. Among the more significant applications and results are the following: • Clinical practice options and care standards • Medical and health professional education and training • Building blocks for pathways and algorithms • Evaluation studies of clinical practice guidelines use and outcomes • Research gap identification • Cost and policy studies for improved quantification • Primary source for consumer information and public education • Knowledge base for improved professional consensus building Additional benefits include: • Reduced incidence and recurrence of pressure ulcer in

	patients with spinal cord injury
SINGAPORE MOH (2001)	• Minimise pain • Decrease complication rate • Reduce morbidity and mortality
RNAO (2002)	• Guideline implementation is intended to help nurses in a variety of health care settings with the assessment and management of stage I to stage IV pressure ulcers in Canadian clients. • Appropriate evaluation and management of pressure ulcers may help promote wound healing, prevent further skin breakdown, and decrease the incidence and severity of pressure ulcers. • Nurses, other health care professionals and administrators who are leading and facilitating practice changes will find this document valuable for the development of policies, procedures, protocols, educational programs, assessment and documentation tools, etc.
UIGN (2002)	• Improved size and condition of pressure ulcer • Prevention of ulcer progression • Improved consistency of care along with decreased variability of practice

WOCN (2003)	• Early identification of individuals at risk for developing pressure ulcers and early prevention measures.
	• Appropriate strategies/plans to:
	  • Attain/maintain intact skin
	  • Prevent complications
	  • Promptly identify or manage complications
	  • Involve patient and caregiver in self-management
	• Cost-effective strategies/plans that prevent and treat pressure ulcers

Harms	
AMDA (1996 reviewed 2003)	Repositioning the patient to prevent the formation of pressure ulcer may sometimes result in pain. If palliative care is the goal, pain control may take precedence over turning and positioning to prevent and treat pressure ulcers.
AMDA (1999 reviewed	Not stated

2004)	
CSCM (2000 reviewed 2005)	Mechanical debridement is slow and can be painful and should be discontinued when necrotic tissue has been removed. Bleeding, the need for anesthesia and its associated risks, and possible injury to nervous or other viable tissue are the main disadvantages of sharp or surgical debridement techniques.
SINGAPORE MOH (2001)	Complications of sharp debridement include bleeding, possible nerve damage, and transient bacteraemia during debridement.
RNAO (2002)	• Some commercial wound cleansers contain ingredients that may be toxic to white blood cells. • Care must be taken in choosing and using wound dressings because of the potential for outside contamination, leaving residual fibers or foreign substances within the wound, and traumatizing the wound bed during removal. • Sharp debridement with the use of a scalpel, scissors, or other sharp instrument is a high-risk procedure that should be undertaken with caution and performed by specially trained and experienced health care professionals. Subcutaneous debridement with a scalpel is a controlled act that must be carried out by a physician or the delegate. It causes bleeding may require anesthetic, and has the potential to cause injury to nervous or other viable tissue. • Mechanical debridement is a slow process, can be painful, and should be discontinued when necrotic tissue has been removed. Wet-to-dry dressings in particular are nonselective in that they remove both viable and necrotic tissue, and are potentially damaging to granulation and epithelial tissue. It is important to ensure that appropriate and adequate pain management is incorporated into the plan of care when this method is utilized. • Autolytic debridement is slow, and should not be utilized on infected ulcers. It may be prudent to avoid all occlusive dressings if anaerobic infection is suspected or cultured, as occlusive dressings are thought to promote an anaerobic environment.
UIGN (2002)	Isolated instances of patients being injured when placed on "high tech" low air loss beds
WOCN (2003)	• Wounds treated with topical antibiotics may develop resistant organisms over time. • Topical creams, ointments, and gels containing antibiotics may cause sensitivity reactions. • Rates of surgical complications and recurrence are high.

	• Complications rates have been reported at 7% to 49%. • Osteomyelitis has been cited as the major cause of breakdown after surgery and biopsy is recommended to rule out osteomyelitis in Stage IV pressure ulcer patients.

TABLE 4: EVIDENCE RATING SCHEMES AND REFERENCES	
AMDA (1996 reviewed 2003)	Not applicable
AMDA (1999 reviewed 2004)	Not applicable
CSCM (2000 reviewed 2005)	Hierarchy of the Levels of Scientific Evidence: I. Large randomized trials with clear-cut results (and low risk of error) II. Small randomized trials with uncertain results (and moderate to high risk of error III. Nonrandomized trials with concurrent or contemporaneous controls IV. Nonrandomized trials with historical controls V. Case series with no controls Categories of the Strength of Evidence Associated With the Recommendations A. The guideline recommendation is supported by one or more level I studies B. The guideline recommendation is supported by one or more level II studies C. The guideline recommendation is supported only by level III, IV, or V studies Levels of Panel Agreement with the Recommendation Based on a 5-point scale (1 corresponding to neutrality; 5 representing maximum agreement) Low: Mean agreement score of 1.00 to 2.32 Moderate: Mean agreement score of 2.33 to 3.66

	Strong: Mean agreement score of 3.67 to 5.00 Note: If the literature supporting a guideline recommendation came from two or more levels, the number and the level of evidence supporting the studies are reported (e.g., a guideline recommendation that is supported by two studies, one a level III and the other a level V, the scientific evidence would be indicated as III, V). Likewise, if a guideline recommendation is supported by literature that crossed two categories, both categories are reported (e.g., a recommendation that includes both level II and III studies would be classified as category B, C).
SINGAPORE MOH (2001)	Individual Study Validity Ratings ++ All or most of the criteria have been fulfilled. Where they have not been fulfilled the conclusions of the study or review are thought very unlikely to alter. + Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought unlikely to alter the conclusions. - Few or no criteria fulfilled. The conclusions of the study are thought likely or very likely to alter. Levels of Evidence The study design is designated by a numerical prefix: "1" for systematic reviews or meta-analyses or randomised controlled trials (RCTs) "2" for cohort and case-control studies "3" for case reports/series "4" for expert opinion/logical arguments/"common" sense Hierarchy of the Levels of Scientific Evidence Each study is assigned a level of evidence by combining the design designation (1, 2, 3 or 4) and its validity rating (++, + or -). The meaning of the various 'levels of evidence' are given

	below: 1 + + High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias. 1 + Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias. 1 - Meta-analyses, systematic reviews, or RCTs with a high risk of bias. 2 + + High quality systematic reviews of case-control or cohort studies. High quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal. 2 + Well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal. 2 - Case-control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal. 3 Non-analytic studies, e.g., case reports, case series. 4 Expert opinion. Categories of the Strength of Evidence Associated with the Recommendations

	A At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or A body of evidence, consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results. B A body of evidence, including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+. C A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++. D Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+. Interpretation of the D/4 Grading The grading system emphasises the quality of the experimental support underpinning each recommendation. The grading D/4 was assigned in cases where: • It would be unreasonable to conduct a RCT because the correct practice is logically obvious • Recommendations derived from existing high quality evidence-based guidelines. The guideline developers alert the user to this special case by appending the initials of the source in the original guideline document. e.g., (D/4; Bergstrom et al 1994; JBI 1997) References Supporting the Recommendations Bergstrom N, Bennett MA, Carlson CE, et al. Treatment of pressure ulcers. Rockville (MD): Agency for Healthcare Research

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RNAO (2002)	Levels of Evidence The definitions of the strength of evidence supporting the recommendations used to develop this guideline were adapted from the AHCPR. • Strength of Evidence A: Requires at least two randomized controlled trials (RCTs) as part of the body of literature of overall quality and consistency addressing the specific recommendations. • Strength of Evidence B: Requires availability of well conducted clinical studies but no randomized clinical trials on the topic of recommendations. • Strength of Evidence C: Requires evidence from expert committee reports or opinions and/or clinical experience of respected authorities. Indicates absence of directly applicable studies of good quality.
UIGN (2002)	Evidence Grades

A. Evidence from well-designed meta-analysis.
B. Evidence from well-designed controlled trials, both randomized and nonrandomized, with results that consistently support a specific action (e.g., assessment, intervention or treatment).
C. Evidence from observational studies (e.g., correlational, descriptive studies) or controlled trials with inconsistent results.
D. Evidence from expert opinion or multiple case reports

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WOCN (2003)	Rating Scheme for the Strength of the Evidence Each article was assigned a level of evidence rating scheme using the following criteria: Level I: A randomized controlled trial (RCT) that demonstrates statistically significant difference in at least one important outcome defined by p<.05. Level II: A RCT that does not meet Level I criteria. Level III: A nonrandomized trial with contemporaneous controls selected by some systematic method. A control may have been selected because of its perceived suitability as a treatment option

	for individual patients. Level IV: A before-and-after study or a case series of at least 10 patients using historical controls or controls drawn from other studies. Level V: A case series of at least 10 patients with no controls. Level VI: A case report of fewer than 10 patients. Level of Evidence Rating Level A: Two or more RCTs on pressure ulcers in humans (at Levels I or II), meta-analysis of RCTs, or Cochrane Systematic Review of RCTs Level B: One or more controlled trials on pressure ulcers in humans or two or more supporting trials in an animal model (at Level III) Level C: One supporting controlled trial, at least two supporting case series that were descriptive studies on humans, or expert opinion. Where a level of evidence rating is not included, the information presented represents a consensus of the panel members.

GUIDELINE CONTENT COMPARISON

The American Medical Directors Association (AMDA, 1996 [reviewed 2003]; 1999 [reviewed 2004]), Consortium for Spinal Cord Medicine (CSCM), Registered Nurses Association of Ontario (RNAO), SINGAPORE Ministry of Health (SINGAPORE MOH), University of Iowa Gerontological Nursing Interventions Research Center (UIGN), and Wound, Ostomy, and Continence Nurses Society (WOCN) present recommendations for treatment of pressure ulcers. CSCM, SINGAPORE MOH, RNAO, UIGN, and WOCN provide explicit reasoning behind their judgments, ranking the level of evidence for each major recommendation. AMDA (1996 [reviewed 2003]) and AMDA (1999 [reviewed 2004) provide their rationale in narrative format.

Some guidelines are broader in scope than others. For example, CSCM and WOCN address prevention of pressure ulcers in addition to treatment; AMDA (1996 [reviewed 2003]) (1999 [reviewed 2004]), RNAO, SINGAPORE MOH, and UIGN address organizational and policy issues related to pressure ulcer management; RNAO considers educational needs of health professionals; and CSCM addresses areas where more research is needed.

The content of the CSCM guideline is tailored to individuals with spinal cord injury. It considers some issues not addressed by the other guidelines (which focus on the general population of adults with pressure ulcers), including the need for individualized wheelchair prescribing and additional aspects of positioning relevant to wheelchair-bound patients.

Areas of Agreement

Assessment/Diagnosis

The guidelines are in general agreement that the pressure ulcer should be assessed within the context of the patient's physical and psychosocial health, including functional, nutritional, and cognitive status and comorbidities. They also agree that initial assessment of a pressure ulcer should include careful evaluation and documentation of the wound characteristics, including its location, size, and depth; existence of tunneling, undermining, and sinus tracts; color of the wound and surrounding tissue; drainage; and odor.

As a recommended initial assessment tool for characterizing ulcer stage, the National Pressure Ulcer Advisory Panel (NPUAP) four-stage system is included in or referred to by the AMDA (1996 [reviewed 2003]), SINGAPORE MOH, RNAO, UIGN, and WOCN guidelines. CSCM notes that, while the NPUAP system is one of several systems developed to describe the depth of pressure ulcers and is the most commonly used, other systems use more descriptive criteria and possess good interrater reliability. According to AMDA (1999 [reviewed 2004]), staging of an ulcer is a descriptive short-cut that only reflects the depth of the wound in terms of tissue layers involved. It may not accurately reflect problems such as soft tissue infection or tunneling. The SINGAPORE MOH, and RNAO guidelines caution that the NPUAP staging system should be used only during initial assessment and not for determining progress in healing, because the healing process is not a simple reversal of the wound development process.

Treatment

Wound Care

The guidelines agree that pressure ulcers should be carefully cleansed, debrided, and dressed. Non-cytotoxic cleansers, specifically normal saline solution, should be used rather than antiseptic solutions (Ringer's lactate or sterile water is also suggested by RNAO). CSCM, SINGAPORE MOH, RNAO, UIGN, and WOCN indicate that irrigation pressure should be strong enough to enhance cleansing without causing trauma to the wound bed. According to the AMDA (1996 [reviewed 2003]), RNAO and UIGN guidelines, pressure of 4 to 15 pounds per square inch (psi) is safe and effective, and these guidelines specify devices that will achieve these pressures.

The guidelines are also in agreement that the method of debridement (autolytic, enzymatic, mechanical, or sharp debridement) should be selected based on the patient's condition, treatment goals, and the amount of eschar and necrotic tissue in the wound. According to AMDA (1999 [reviewed 2004]), RNAO and SINGAPORE MOH, sharp surgical debridement is appropriate when debridement is urgently indicated due to presence of advancing cellulitis or sepsis. AMDA (1996 [reviewed

2003]), AMDA (1999 [reviewed 2004]), RNAO, and WOCN recommend against debridement of dry, black eschar on heels that are nontender, nonfluctuant, nonerythematous and nonsuppurative.

The guidelines also agree that wound dressings should keep the ulcer bed continuously moist and the surrounding tissue dry. The type of dressing should be chosen based on wound characteristics.

Infection Management

AMDA (1999 [reviewed 2004]) and WOCN emphasize the need to distinguish between infection, contamination, and colonization of the wound. According to AMDA (1999 [reviewed 2004]), a local soft tissue infection may be a significant priority, whereas contamination and colonization usually should not be treated. AMDA (1996 [reviewed 2003]), AMDA (1999 [reviewed 2004]), CSCM, RNAO, UIGN, and WOCN agree that clean wounds not responding to treatment within 2 to 4 weeks can be treated with a two-week trial of topical antibiotics. WOCN recommends that topical antibiotics be used cautiously and selectively and be considered when high levels of bacteria are present. The WOCN guideline notes that wounds treated with topical antibiotics may develop resistant organisms over time. When infection is suspected, an appropriate deep tissue culture or biopsy should be obtained (AMDA 1996 [reviewed 2003], AMDA 1999 [reviewed 2004], CSCM, WOCN). Of the four guidelines that address systemic infection, all agree that systemic antibiotics are appropriate when there is evidence of cellulitis, osteomyelitis, or sepsis (AMDA 1996 [reviewed 2003], CSCM, RNAO, WOCN). SINGAPORE MOH does not address infection management.

Tissue Load Management

With the exception of SINGAPORE MOH, the guidelines address tissue load management, including the need to protect tissue by minimizing pressure and shear. AMDA (1996 [reviewed 2003]), AMDA (1999 [reviewed 2004]), CSCM, RNAO, and WOCN all address positioning, use of pressure-reducing devices, and lifting and positioning aids both to aid healing of pressure ulcers and prevent development of new ulcers. The CSCM guideline, targeting care for persons with spinal cord injury, provides the most extensive recommendations concerning wheelchair positioning, including the need to prescribe wheelchairs according to individualized anthropometric, ergonomic, and functional principles and to regularly inspect wheelchair cushions. UIGN addresses tissue load management in a separate guideline on prevention (See NGC guideline synthesis on Pressure Ulcer Prevention).

Pain Management

Five guidelines address the need for adequate pain management (AMDA 1996 [reviewed 2003], AMDA 1999 [reviewed 2004], RNAO, SINGAPORE MOH, and UIGN). Four guidelines, AMDA (1996 [reviewed 2003]) (1999 [reviewed 2004]), RNAO and WOCN, specifically note the need for management of pain associated with debridement.

Nutritional Support

The guidelines are in general agreement that measures should be taken to assess nutritional status and ensure adequate nutrition and hydration. RNAO and UIGN suggest consultation with a dietitian; RNAO also recommends consultation with a speech language pathologist for swallowing assessment. AMDA (1996 [reviewed 2003]), CSCM, UIGN and WOCN point out the need for optimal protein intake to promote wound healing. AMDA (1996 [reviewed 2003]), CSCM and RNAO consider the need for nutritional supplements; AMDA (1999 [reviewed 2004]) states that they are often important, but are not automatically required. RNAO also considers enteral tube feeding and parenteral nutrition.

Surgical Intervention

AMDA (1996 [reviewed 2003]) (1999 [reviewed 2004]), CSCM, RNAO and WOCN recommend that surgical intervention be considered for Stage III and IV ulcers that have not responded to conservative therapy. RNAO notes that candidates for surgical intervention should be medically stable, adequately nourished, and able to tolerate operative blood loss and postoperative immobility. CSCM addresses surgery in the greatest detail, including recommendations for preoperative and postoperative care and potential post-surgery complications in persons with spinal cord injury. Neither SINGAPORE MOH nor UIGN addresses surgical interventions.

Adjuvant Therapy

With the exception of SINGAPORE MOH, the guidelines all address the use of adjuvant therapies when an ulcer has not responded to conventional therapy. All agree that electrical stimulation is an appropriate therapy to consider. There are differences, however, among the guidelines concerning the effectiveness of other adjuvant therapies; these differences are discussed below.

Reassessment and Ongoing Care

The guidelines are in general agreement that pressure ulcers should be monitored at each dressing change and reassessed at least weekly, although AMDA (1999 [reviewed 2004]), addressing the needs of adults in long term care settings, recommends the ulcer be reassessed by the physician at each routine visit.

CSCM points out the need to identify the potential psychosocial impacts of pressure ulcers and immobility in persons with spinal cord injury and to provide referral for therapeutic interventions such as vocational rehabilitation, peer counseling, support groups, and psychotherapy.

Areas of Differences

Adjuvant Therapy

Although there is general agreement that electrical stimulation is an appropriate therapy, there is less agreement concerning other adjuvant therapies. For example, CSCM did not find sufficient evidence to recommend any adjuvant therapy except electrical stimulation, whereas AMDA (1999 [reviewed 2004]), RNAO, and WOCN agree that growth factors can be helpful for chronic non-healing wounds. Additionally, RNAO, UIGN, and WOCN recommend vacuum-assisted

closure (negative pressure therapy), with RNAO and WOCN also recommending normothermic heat therapy. RNAO is the only guideline to recommend therapeutic ultrasound and pulsed electromagnetic fields, and UIGN alone recommends hyperbaric oxygen therapy. These differences in recommendations may be related to the different guideline publication dates and the corresponding literature bases available to the developers. For example, several studies of adjuvant therapy (concerning ultraviolet light, electromagnetic fields, vacuum-assisted closure, and normothermic heat therapy) cited by RNAO and WOCN were published in 2001 and 2002 and thus not available to the developers of the AMDA and CSCM guidelines.

This Synthesis was prepared by ECRI on October 31, 2006. The information was verified by UIGN on November 21, 2006, by AMDA and WOCN on December 5, 2006, and by RNAO on December 11, 2006.

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